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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,713	12/02/2003	Yoshihiro Ikoma	65933-055	2215

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McDERMOTT, WILL & EMERY  
600 13th Street, N.W.  
Washington, DC 20005-3096

EXAMINER
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CHUO, TONY SHENG HSIANG

ART UNIT	PAPER NUMBER
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1745

MAIL DATE	DELIVERY MODE
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10/01/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/724,713		IKOMA, YOSHIHIRO	
	<b>Examiner</b>		<b>Art Unit</b>	
	Tony Chuo		1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 August 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/21/07</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/30/07 has been entered.

### ***Response to Amendment***

2. Claims 1-16 are currently pending. The amended claims do overcome the previously stated 102 and 103 rejections. However, upon further consideration, claims 1-16 are rejected under the following new 102 and 103 rejections.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 1 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Yasumoto et al (JP 2000-243404). The Yasumoto reference discloses a fuel cell comprising: an anode, a cathode, and a solid polymer electrolyte membrane placed

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between the anode and cathode, wherein both the anode and cathode comprise a gas diffusion layer; and a catalyst layer formed on the gas diffusion layer; wherein the catalyst layer comprises catalyst particles supported on a hydrophilic carbonaceous material, an ion conductive polymer, and a water repellent carbonaceous material; and wherein the content of the water carbon material in the catalyst layer is about 16 wt% with respect to a weight of the entire catalyst layer (See Abstract and paragraph [0024]).

5. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Knights et al (WO 01/15255). The Knights reference discloses an electrode for a fuel cell comprising: a catalyst layer formed on a carbon fiber paper substrate, wherein the catalyst layer comprises a Pt/Ru alloy supported on Shawinigan carbon black, a Nafion ionomer, and between 12% to 32% by weight of a hydrophobic additive, wherein the hydrophobic additive includes graphite (See page 15, lines 24-28; page 16 line 22 to page 17 line 5; and claim 8).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2-4 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasumoto et al (JP 2000-243404) in view of Terazono et al (US 2002/0009626).

The Yasumoto reference is applied to claims 1 and 9 for reasons stated above.

However, Yasumoto et al does not expressly teach an average value of lattice spacing of the [002] plane,  $L_c(002)$ , of the second carbon particle that is between 0.337nm and 0.348nm and a crystallite size in a direction of c-axis,  $L_c(002)$ , of the second carbon particle that is between 3nm and 18nm. The Terazono reference discloses a graphitized carbon support for a catalyst layer that has an average lattice spacing of  $d_{002}$  of 0.341 and a crystallite size  $L_c$  of 3.5 nm (See paragraph [0008],[0048]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize graphitized carbon particles having the above cited properties as the water repellent carbon material in the Yasumoto electrode in order to provide adequate water repellency which is controlled by the degree of graphitization of the carbon black particles (See paragraphs [0013],[0016],[0075]).

8. Claims 1 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buche et al (WO 03/058735). The Buche reference discloses a PEM fuel cell comprising an anode, a cathode, and a solid electrolyte membrane between the anode and cathode, wherein the cathode comprises a gas diffusion substrate, and an electrocatalytic layer formed on the gas diffusion substrate, and wherein the electrocatalytic layer comprises a platinum supported carbon black, a proton-conducting polymer, and particulate graphite at a loading of 1-40wt%. However, Buche et al does not expressly teach a second carbon particle in the catalyst layer that is in a range of 10wt% to 50wt% with respect to a weight of the entire catalyst layer. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made

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to modify the Buche electrode to include a second carbon particle in the catalyst layer that is in a range of 10wt% to 50wt% with respect to a weight of the entire catalyst layer because product claims with numerical ranges which overlap prior art ranges were held to have been obvious (*In re Wertheim* 191 USPQ 90 (CCPA 1976)).

9. Claims 2-4 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buche et al (WO 03/058735) in view of Terazono et al (US 2002/0009626). The Buche reference is applied to claim 1 for reasons stated above.

However, Buche et al does not expressly teach an average value of lattice spacing of the [002] plane,  $L_c(002)$ , of the second carbon particle that is between 0.337nm and 0.348nm and a crystallite size in a direction of c-axis,  $L_c(002)$ , of the second carbon particle that is between 3nm and 18nm. The Terazono reference discloses a graphitized carbon support for a catalyst layer that has an average lattice spacing of  $d_{002}$  of 0.341 and a crystallite size  $L_c$  of 3.5 nm (See paragraph [0008],[0048]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize graphitized carbon particles having the above cited properties as the hydrophobic carbon black particles in the Buche electrode in order to provide adequate water repellency which is controlled by the degree of graphitization of the carbon black particles (See paragraphs [0013],[0016],[0075]).

10. Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buche et al (WO 03/058735) in view of Koschany et al (US 6451470). The Buche reference is applied to claim 1 for reasons stated above.

However, Buche et al does not expressly teach a gas diffusion layer that also includes the first hydrophilic carbon particle and the second hydrophobic carbon particle. The Koschany reference discloses a gas diffusion layer comprising a first carbon fiber material that is filled with a second carbon material that has a hydrophobic surface (See column 4, lines 16-32).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Buche electrode to include a gas diffusion layer that also includes the first hydrophilic carbon particle and the second hydrophobic carbon particle in order to maintain a high effective diffusion constant for reaction gases and a low effective diffusion constant for water so that water content is balanced in the electrode.

11. Claims 6-8 and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buche et al (WO 03/058735) in view of Terazono et al (US 2002/0009626) as applied to claims 2-4 above, and further in view of Koschany et al (US 6451470).

However, Buche et al as modified by Terazono et al does not expressly teach a gas diffusion layer that also includes the first hydrophilic carbon particle and the second hydrophobic carbon particle. The Koschany reference discloses a gas diffusion layer comprising a first carbon fiber material that is filled with a second carbon material that has a hydrophobic surface (See column 4, lines 16-32).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Buche/Terazono cathode electrode to include a gas diffusion layer that also includes the first hydrophilic carbon particle and

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the second hydrophobic carbon particle in order to maintain a high effective diffusion constant for reaction gases and a low effective diffusion constant for water so that water content is balanced in the electrode.

### ***Response to Arguments***

12. Applicant's arguments, see Remarks, filed 7/30/07, with respect to the rejection(s) of claim(s) 1-16 under 35 USC 102 and 103 have been fully considered and are persuasive. Therefore, the rejections have been withdrawn. However, upon further consideration, a new ground(s) of rejection are made in view of Yamamoto et al (JP 2000-243404) and Buche et al (WO 03/058735).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571) 272-0717. The examiner can normally be reached on M-F, 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.



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TC

A handwritten signature in black ink, appearing to read 'J. Crepeau', with a large checkmark-like flourish at the end.

**JONATHAN CREPEAU  
PRIMARY EXAMINER**